

Forestry.

The following was sent us by B. E. Fernow, Chief of the Forestry Division, United States Department of Agriculture, as Circular No. 6:—

It may be set down as a rule, with few exceptions, that it is preferable and in the end more economical to grow seedlings in the seed-bed and nursery and transplant them, than to sow the seeds in permanent sites.

Success in growing seedlings is attained, first, by providing suitable conditions for the sprouting of the seed, and, secondly, by keeping up proper conditions for the development and growth of the seedling.

In order to know what the conditions are, the planter should have some knowledge of how the sprouting takes place and how the seedling develops and grows.

PRINCIPLES.

Sprouting.—Water, warmth and air are necessary to bring seeds to sprouting; darkness seems also to favor sprouting. To insure best results, the supply of heat and moisture must be moderate, but even and constant. By keeping the earth-cover above the seed loose, sufficient air can penetrate to aid in dissolving the food materials in the seed, and the plantlet can also more easily find its way to the surface and the light. In contact with the moist warm soil, the outer shell or seed-coat takes up water and swells until it bursts; then the embryo (germ or little plantlet) which lies imbedded in the seed, begins to grow, pushes downward into the ground its rootlet and upward to the light its stem and first leaves, called seed-leaves or cotyledons and plumulae (which are often different in shape from the later leaves). The quicker the sprouting proceeds, the less danger of spoiling the seed, to which it is quite liable when lying in the ground too long.

Growth of the Seedling.—After the seed is sprouted and the germ nourished into life by the food stored up in the seed, the seedling must now provide its nourishment from outside. This it takes partly from the soil, partly from the air. From the air, carbonic gas is taken up directly by the leaves, in which it is changed into vegetable substance under the influence of light and heat. The food materials contained in the soil must first be dissolved, so that the roots may be able to take them up; for this again, water, heat and oxygen (air) are necessary. The food in watery solution is then conveyed by the roots through the stem to the leaves, which are the digesting apparatus (the stomach as it were) of the plant. Here, under the influence of light and heat, the water in which the food was dissolved is partly evaporated (transpired) and the food assimilated, used in forming vegetable substance, i. e., increasing the plant in size.

For the growth of the seedling, then, it is necessary that it should have at the roots a loose soil, rich in plant food, into which the rootlets can penetrate; water, warmth and air, in order to dissolve the plant food; and at the leaves light, warmth and air, in order to digest and transform the plant food into vegetable substance.

Transpiration from the leaves, which means giving up water to the air, is necessary to make plants grow, but excessive transpiration may kill

the plants, and insufficient transpiration may keep the seedlings weak and undeveloped, or even kill them. Hot air and strong light make the leaves transpire greater quantities of water than when the air is cool or saturated with moisture and the plants are shaded. They also transpire more when the air is in motion than when it is quiet; a certain degree of circulation of air, however, is as necessary to plants as to human beings.

The main difficulty in growing seedlings is to regulate transpiration, to keep the water supply at the roots and the degree of light and heat at the top properly balanced.

Light and heat (or dry air) are the task-masters which make the leaves work, evaporating the water that is supplied at the roots. If the supply from the roots runs short, the plantlet soon exhausts itself in the endeavor of satisfying its task-masters, and dries up; and even with ample supply of water the task required may be too much, and the delicate machinery of the plantlet may not be able to work fast enough and may break down under too great a strain. On the other hand, if too much water be supplied at the roots, they are liable (with most plants)

less readily according to the structure of the seed-coat. Some will swell in a few hours, others will take several days, and in some seeds swelling occurs—under ordinary circumstances—only after months and years, like black and honey locust, acacias, red bud, juniper, Kentucky coffee tree. These are called "refractory" and are said to "lie over", that is, they do not sprout readily, but may lie on the ground for one or more seasons without sprouting. Some seeds become "refractory" by being kept, and their coat being allowed to become dry; they lose the faculty of absorbing water readily, and the swelling may be delayed a year or more (they lie over). This is the case with ash, larch, fir, Douglas spruce and others. Such seeds can be made to sprout more readily by soaking them in water (hot or cold), and by various other methods.

To preserve seeds in good condition, the main point is to keep them cool and prevent them from drying out by mixing them with sand or in any other way.

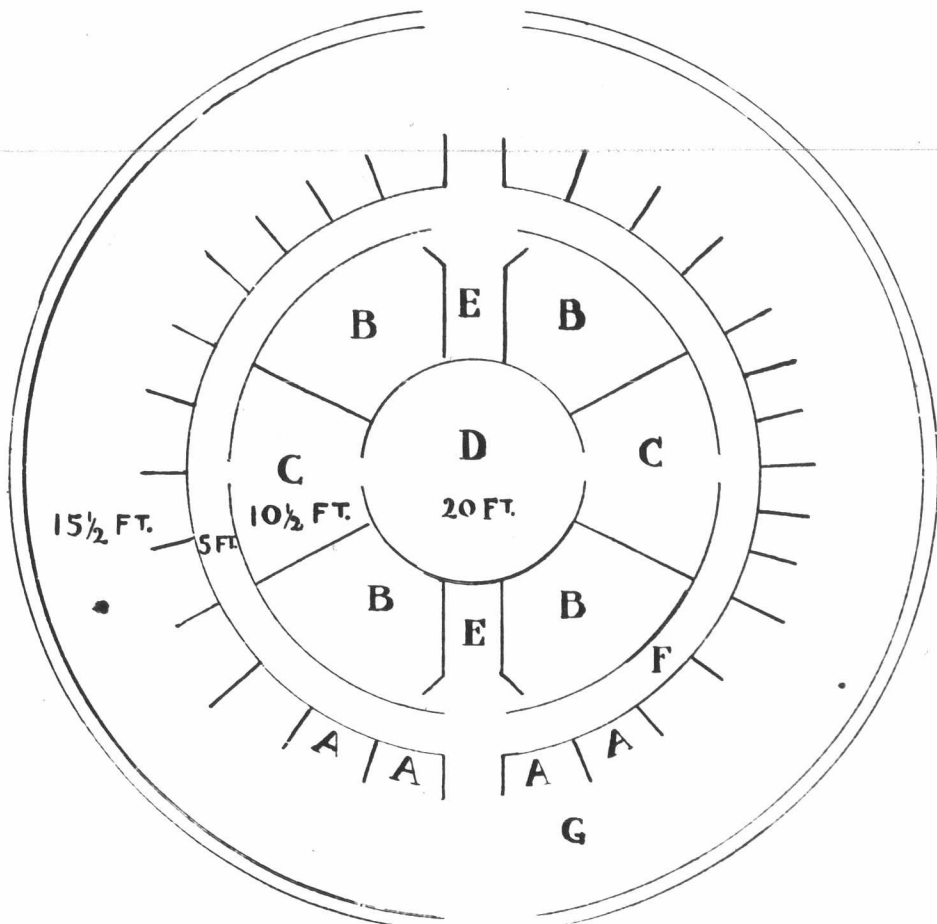
[TO BE CONTINUED.]

Agricultural Organization.

AN ADDRESS DELIVERED BY J. S. THOMSON, PRESIDENT OF THE FARMER'S INSTITUTE AT MELITA.

GENTLEMEN,—Your calling, agriculture, has in all ages and in all climes been considered by the wise and great the most useful and honorable calling in life, and still some people think every position in life is respectable and honorable but farming. The farmer constitutes the true nobility of the land. In fact, the farmers own the country, or at least ought, for we are eight-tenths of the population of this glorious country. It is often asked, Is farmers' organization necessary? I say yes! It is said there is no class so difficult to organize as the farmer, and none would derive greater advantages than he by working together, as he has thereby everything to gain and nothing to lose. There is usually wisdom in the multitude of intelligent councilors. Therefore it is necessary we should come together to discuss the best methods of cultivating the soil, and the feeding and raising of farm stock of all kinds, and the beautifying of our homes. One of the prime objects of these meetings

is to get the results of the labor and experience of long years, it may be of some one who has been working for years on some particular line, perhaps to profit or otherwise, for one man's prosperity has no tendency to keep his neighbor poor, but the reverse is the case. It has a tendency to stimulate him to greater energy. The farmers as a class are very conservative in their ideas. I do not mean politically, for I suppose they are about evenly divided on that question, but by following up the old routine of their forefathers. Organization is the order of the day. Everything a farmer buys comes to him through organized channels, and much of that he sells passes through organized Boards of Trade and Millers' Associations, who regulate the prices, especially the Millers' Association, as all is bought through a central buyer who gives just what he pleases. The hands that hold the plow are the same that feed the millions. Therefore, on our prosperity depends the prosperity of the country. The art or science of agriculture is the precursor of all arts,



(There should be no opening from D to C.)

A A—Stalls. B B—Box stalls. C C—Root Compartments. D—Silo. E E—Passage and feed box.

to rot. The supply of moisture at the roots must, therefore, be kept even and moderate, while the rate of transpiration may be regulated above and kept in proportion by the use of various contrivances.

Seed.—In regard to the seed, the planter should have at least the following knowledge:—Not all trees produce seed every year, and only few trees, if any, produce all perfect seed. The number of seeds in one hundred which will germinate (percentage of germination), even in a fresh sample, varies with the kind and the year.

Some seeds lose their power of germination (sprouting) soon after ripening and must be sown at once. Such are willows, poplars, birches, elms, soft maples, etc. Others may be kept, with proper precautions, for one season (oak, chestnut, alder, ash, maple, linden, fir); a few can be kept alive for many years (spruce, larch and pine). The heavier and larger seeds produce the best plants.

The different kinds swell and sprout more or